occurrence of typical *Cantharellus cibarius* var. *cibarius* in the Pacific Northwest (USA) or British Columbia, although there are collections labelled *C. cibarius* from B.C. in DAOM which lack field notes and are not *C. formosus*. When one excludes the fungus now known to be *C. formosus*, the other chanterelle closest to *C. cibarius*, appears to be the fungus described below as *C. cibarius* var. *roseocanus*, an ectomycorrhizal associate of spruce and perhaps other conifers. Until stronger evidence becomes available to indicate specific distinctions, we opt to recognize the new chanterelle at the varietal level.

***Cantharellus cibarius* var. *roseocanus* var. nov.**: *differt a C. cibarius* var. *cibarius colore pilei marginati rosei.*

Holotypus: DAOM 220723 (SAR 7994).

Pileus 20 - 120 mm diam., moist, glabrous, initially plano-convex with inrolled edges, becoming depressed centrally and highly lobed and crisped marginally, sometimes shallowly to deeply infundibuliform or nearly multipileate when deeply incised and forming fan-shaped lobes, varying from pale yellow pink [31] to gray yellow pink [32] from a heavy hoar especially dominate marginally, to brilliant orange yellow [67] centrally when young, when more mature soft orange yellow [68], medium orange yellow [71], brilliant orange yellow [67] or light orange yellow [70], masked on margins by a pale yellow pink [31] to pale orange yellow [73] hoar-like coating (salmon coloured when both pigmented layers blend), and on some pilei vaguely concentrically ringed by broad bands.

Hymenophore when young light yellow [86] to pale orange yellow [73], with age light orange yellow [70] to brilliant orange yellow [67] or pale orange yellow 73]; hymenium decurrent, forming shallowly anastomosing folds that fork two to three times towards the margins, ultimately ribbed, with ribs forming anastomoses in parts, when young the folds 1 mm distant, becoming 2-4 mm distant and up to 5 mm deep in age.

Stipe typically short relative to the pileus width but occasionally elongated, 15 - 50 mm long, 7 - 24 mm wide apically, solid, with a tapered to rounded base; surface light orange yellow [70] to light yellow [86], variably sheathed by a decurrent hymenium which imparts light orange yellow [70] to brilliant orange yellow [67] colour to the surface, this sheathing layer sometimes fragmenting from stipe elongation, sometimes banded, sometimes patchy, towards the base, on older basidiomes the unsheathed stipe pale orange yellow [73] or whiter or grayer but often with some more intensive orange or yellow traces basally. Without obvious immediate

bruising, but darker on old damaged patches.

Dark gray fibrils of a dematiaceous contaminant seemingly staining the base of some stipes.

Spore deposit (in beads on spider webs across the hymenium) concolourous with the hymenium, i.e. orangish yellow.

Pileipellis initially, and often remaining so towards the incurled margins, a radially inclining turf of free hyphal ends which soon collapse into a radially matted, thin, microscopically hyaline to yellowish layer, exhibiting many long, bluntly tipped hyphal ends. Hyphae and hyphal ends 3.5 - 5.5μm diam., smooth, with slightly thickened walls up to 0.8μm thickness. Hypodermal hyphae slightly more compactly arranged than deeper in the trama, and more heavily pigmented with yellowish contents. Tramal hyphae 2.5-9μm diam, subhyaline to faintly yellowish, interspersed with oleiferous hyphae, 3-4μm diam with refractive contents. Hymenial cystidia absent. Hymenium thickening with the subhymenium a thick ill defined zone. Basidia 4,5,6-spored, 116-128 X 7.3-9μm; sterigmata large, 4-6μm long, and incurved, with the fifth and sixth further from the apex. Basidiospores (Fig.14) (6-)7.5-10(-11.3) X 4.5-5.5μm, av./10 = 8.5 X 4.9μm, L/W 1.72-1.74, ovoid to ellipsoid in face view, slightly inequilateral in profile, smooth, thin-walled, hyaline, nonamyloid. Hyphae in the stipe similar to the tramal hyphae but more clearly aligned vertically. Basal mycelial hyphae smooth, thin-walled, 2.5-4μm. Clamp connections abundant in all tissues.

Habit and Habitat: Solitary to gregarious, often in small clusters , on bare or mossy or grassy needle beds, in second growth spruce (*Picea sitchensis*) without other tree associates, or under spruce (*Picea* spp.) with hemlock (*Tsuga* spp.) and or fir (*Abies* spp.).

Specimens examined and described (all DAOM): Canada: British Columbia: Queen Charlotte Islands, Graham Island, Naikoon Provincial Park, Tow Hill, 20 Sept 1982, SA Redhead (220892), 28 Sept 1982, SAR (220893); Vancouver Island, Pacific Rim National Park, Wickaninnish Bay, N49°03' W125°43', Long Beach, 15 Sept 1995, SAR (220723 [Holotype], 220724, 220725, 220726). **U.S.A.: Washington:** Skamania Co., Gifford Pinchot National Forest, Steamboat Natural Research Area (SE quarter, Sec. 35, T 8N, R 8E, elev. 4,000'), 21 Sept 1996, J Lindgren (220872).

Mr. Campbell (PRNP) led Redhead to the type locality, indicating that both that site and the *C. formosus* site across the highway higher up on the treed dunes were illegally harvested by commercial mushroom poachers seeking both chanterelles and boletes. Later, a discussion with the owner

of one of the southeastern Vancouver Island chanterelle buying stations revealed that chanterelles were brought in from across the entire island, and that one form was locally known as the "big yellow one." It seems probable that *C. cibarius* var. *roseocanus* is the larger more conspicuously yellow taxon being brought into the stations along with *C. formosus*. The common name **Rainbow Chanterelle** is suggested. It sports an array of colours, it occurs in rain forests, and at its end it is golden.

Preliminary Field Key to *Cantharellus* subgenus *Cantharellus* from the PNW and BC (excluding California):

1. Basidiomes whitish overall (pallid, ivory, or buff), tardily staining yellowish where handled; apparently associated with Douglas Fir ..... ***C. subalbidus***

1. Basidiomes under normal conditions distinctly pigmented with yellow, yellowish pink, yellowish ochraceous, or orangish colours **2**

2. Pilei with a thin persistent but virtually transparent fuscous coloured cuticle, which may or may not form darkened appressed squamules, but often is detectable simply from a slightly grayer tint to the pileus surface which is otherwise yellowish orange to orangish yellow centrally, and sometimes pinkish to nearly white on the very edge; the **hymenium** when normally pigmented (i.e. not fruiting in virtual darkness) **orangish to orangish yellow with a pinkish tinge** especially evident when the basidiomes are not water-soaked, and in more mature specimens **typically paler than the pileus**; when freshly picked and still succulent, i.e. not dried on the surface, all portions readily **staining yellow** and then becoming ochreous; stipe concolourous with the pileus colouration below the fuscous layer, i.e. yellowish orange to orangish yellow; apparently associated with hemlock, pines, and possibly other conifers ..... ***C. formosus***

2. Pilei **bright orangish yellow** overall when mature, but when young covered marginally or overall by a **thin pinkish or yellowish pink hoary coating**, lacking a fuscous coating, hence neither developing darkened appressed scales nor showing grayer (sooty) tones when partially dehydrated, although a whitening may be present in undamaged partially drying specimens; hymenium a **rich orangish yellow** generally lacking pinkish tints when mature (normally pinkish tints totally absent), **typically the most intensely yellowish pigmented tissue of the basidiomes**, hence as dark or darker than the pileus after the rosy hoar fades; stipe light to dark orangish yellow; not immediately staining yellow or ochreous,

however exhibiting darkened areas where damaged; stipe concolourous with the pileus, or paler, but lacking the pinkish bloom; apparently associated with spruce, but possibly with other conifers such as hemlock also

..... ***C. cibarius* var. *roseocanus***

Cautionary notes: An inadequately characterized form with a pallid pileus, yellow hymenium and stipe is known from Meager Creek in B.C. under poplars mixed with conifers and from Vancouver Island near Port Alberni, under Douglas fir with birch and alder. They may represent *C. pallens*. In California, two taxa have been reported from under Fagaceae, either *Lithocarpus* or *Quercus*. Thiers (1985) reported *Cantharellus cibarius* var. *cibarius* under oaks or related hardwoods, and from Mendocino Co. he described a western form of *C. cibarius* var. *pallidifolius* A.H. Smith, which was previously known from Michigan. Arora (1991, p. 2) published a colour photograph of what may be the latter, amongst either *Lithocarpus* or *Quercus* leaves. States (1990, p. 125) shows yet another form under pines from the Southwestern USA, with a glaucous coating on the pileus, a yellow hymenium, and a yellowish white stipe. All of these may represent independent species.

Microscopical separation of *C. formosus* from *C. cibarius* var. *roseocanus*: Differentiation of dried materials is particularly difficult as specimens of both darken to ochraceous orange, as do some collections of *C. subalbidus* and the suspected *C. pallens*. *Cantharellus formosus* typically has fuscous contents in some of the collapsed cuticular hyphae while *C. cibarius* varieties generally lack them. The determination is subjective and requires comparative materials. The basidiospores of *C. cibarius* var. *roseocanus*, and apparently other close allies of *C. cibarius* are more elongated, often exceeding 10μm in length while *C. formosus* spores rarely exceed 9μm in length. The L/W ratio for *C. formosus* is 1.47-1.6 while that of *C. cibarius* var. *roseocanus* is 1.72-1.74 which is comparable to the 1.77-1.98 ratio in *C. cibarius* var. *cibarius* from Europe (see specimens cited below). Similarly, the basidia of *C. cibarius* var. *roseocanus* tend to be longer, 116-128μm, while those of *C. formosus* are 86-120μm. A combination of all three features may be necessary to separate the two taxa from dried materials lacking detailed field notes, and comparative examination of the related western taxa mentioned above has not been made. Corner (1966) indicated that *C. formosus* had more elongated tramal hyphae than did *C. cibarius*, and therefore was more like C. *odoratus* (Schw.)Fr., an eastern species lacking lamellar folds. However, Thiers (1985) found this character to be less than obvious and our studies indicate that in revived dried materials assessment of this

feature is virtually impossible. Therefore, it is not critically assessed here. Taste, always a subjective characteristic, may be more crucial as subtle peppery tastes, characteristic of *C. cibarius*, may have been undetected by Redhead because he has a higher threshold levels before detecting such tastes, as has been determined during other comparative mushroom taste tests. Fries (1821) also seemed to have failed to detect distinctive tastes and odours for *C. cibarius* initially.

Specimens of *C. cibarius* var. *cibarius* examined: England: Hertfordshire, Stevenage, Knebworth Wood, 12 Oct 1958, EM Redhead (DAOM 66606). Finland: Kainuu, Paltamo, Oikarila, Kivesvaara, 26 Sept 1979, T Ulvinen (DAOM 179443). Sweden: v.c. Garpenberg, 29 Aug 1974, RH Petersen (TENN 39771, 39776); Lychsele Lappmark, Tarna Parish, 5 Sept 1974, RHP (TENN 39778), 6 Sept 1974, RHP (TENN 39846); Uppland, Jumkil Parish, 5 Sept 1948, A Melderis (DAOM 64898).

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REFERENCES

Anonymous, 1930. Geographical Gazetteer of British Columbia. Department of Lands. Victoria, British Columbia.291 pp.

Anonymous, 1939. April 1939 Canadian official Railway Guide with Gazetteer containing Water & Air Lines, Postal, Express, Telegraph and Bank Information. International Railway Publ. Co., Montreal. 896 tables.

_____, 1982. Bolets de Catalunya. Fasc. I. No. 10. *Cantharellus cibarius*. Societat Catalana de Micologia, Barcelona.

_____, 1985. Gazetteer of Canada. British Columbia. 3rd edition. Geographical Services Division, Surveys and Mapping Branch, Department of Energy, Mines and Resources Canada, Ottawa. 281 pp.

_____, 1995. Harvesting edible wild mushrooms in British Columbia (pamphlet). B.C. Ministry of Forests, Victoria.

_____, 1996. Obituaries: Professor John Corner. The Times [London] October 2, 1996.